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NOTICE OF ALLOWANCE AND FEE(S) DUE

22850

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05/14/2008

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

ZIMMER, MARC S

ART UNIT

PAPER NUMBER

1796

DATE MAILED: 05/14/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,704	03/26/2004	Yuko Uchimaru	251148US0	8155

TITLE OF INVENTION: LOW DIELECTRIC CONSTANT INSULATING MATERIAL AND SEMICONDUCTOR DEVICE USING THE MATERIAL

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	08/14/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

22850 7590 05/14/2008

OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/809,704 03/26/2004 Yuko Uchimaru 251148US0 8155

TITLE OF INVENTION: LOW DIELECTRIC CONSTANT INSULATING MATERIAL AND SEMICONDUCTOR DEVICE USING THE MATERIAL

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	08/14/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
ZIMMER, MARC S	1796	428-447000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

1

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 97 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 97 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability**Application No.**

10/809,704

Applicant(s)

UCHIMARU ET AL.

Examiner

MARC S. ZIMMER

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 03/26/08.
2. ☒ The allowed claim(s) is/are 4-9.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Marc S. Zimmer/
Primary Examiner, Art Unit 1796

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with David Stitzel on May 2, 2008.

Please amend the paragraph beginning on page 17, line 10, as follows:

~~{Fig-1}~~ FIG. 1 (a) is a structural formula of B,B,B-tripropynyl-N,N,N-trimethyl borazine and (b) is a diagram illustrating the C-V characteristic (1 MHz) of a borazine-siloxane polymer thin film

Please amend the paragraph beginning on page 17, line 13, as follows:

~~{Fig-2}~~ FIG. 2 (a) is a diagram illustrating the voltage dependency at room temperature of the change of capacity using borazine and (b) is a diagram illustrating the change of voltage of the capacity of a borazine film having a small chlorine content.

Please amend the paragraph beginning on page 17, line 17, as follows:

~~{Fig-3}~~ FIG. 3 (a) is a diagram illustrating the change of voltage of the capacity of a borazine film having a small chlorine content and (b) is a diagram illustrating the CV characteristic of a borazine film having undergone an argon plasma treatment.

Please amend the paragraph beginning on page 17, line 21, as follows:

~~{Fig-4}~~ ~~FIG. 4~~ (a) is a diagram illustrating a hydrosilylation reaction represented by the addition of a Si-H bond to a carbon-carbon triple bond, (b) is a diagram illustrating a borazine derivative and a carbosilane compound used for the synthesis of a borazine-carbosilane polymer and (c) is a diagram illustrating a borazine

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derivative and a silicon compound used for the synthesis of a ~~borazine-silicon~~ borazine-siloxane polymer.

Please amend the paragraph beginning on page 17, line 23, as follows:

~~{Fig. 5}~~ FIG. 5 (a) and (b) are cross sections of a sample having an aluminum (Al) electrode formed on a plate of stainless steel by the technique of evaporation using a metal mask having numerous fine holes opened therein and ~~(b)~~ (c) is a diagram of a capacity-voltage curve of the sample shown in (a).

Please amend the paragraph beginning on page 17, line 27, as follows:

~~{Fig. 6}~~ FIG. 6 is a diagram showing the relation between the force and the depth of embedding determined by the nano-indentation technique.

Please amend the paragraph beginning on page 17, line 29, as follows:

~~{Fig. 7}~~ FIG. 7 (a) and (b) are diagrams respectively showing the data of modulus of elasticity and the data of hardness of various dielectric materials.

Please amend the paragraph beginning on page 17, line 31, as follows:

~~{Fig. 8}~~ FIG. 8 is a diagram showing the TG curve of a borazine-silicon polymer.

Please amend the paragraph beginning on page 18, line 2, as follows:

~~{Fig. 9}~~ FIG. 9 is a diagram showing the data of relative dielectric constant and heat resistance of various polymers.

Please amend the paragraph beginning on page 18, line 4, as follows:

~~{Fig. 10}~~ FIG. 10 is a diagram showing the refractive index of a borazine-silicon polymer.

Please amend the paragraph beginning on page 18, line 6, as follows:

~~{Fig. 11}~~ FIG. 11 is a diagram showing an etching section picture taken with a scanning electron micrograph (SEM).

Please amend the paragraph beginning on page 18, line 8, as follows:

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~~{Fig.-12}~~ FIG. 12 (a) is a diagram showing application of a borazine-silicon polymer to a hard mask and (b), (c) and (d) are pictures of examples of application of hard mask taken with a scanning electron micrograph (SEM).

Please amend the paragraph beginning on page 18, line 11, as follows:

~~{Fig.-13}~~ It is a FIG. 13 (a)-(p) illustrate schematic cross section illustrating sections of exemplary aspects of the third embodiment of this invention.

Please amend the paragraph beginning on page 18, line 13, as follows:

~~{Fig.-14}~~ It FIG. 14 is a diagram showing a model wiring structure used in the simulation of an effective dielectric constant by the finite-element method.

Please amend the paragraph beginning on page 18, line 15, as follows:

~~{Fig.-15}~~ It is a FIG. 15 (a)-(i) illustrate schematic cross section illustrating sections of exemplary aspects of the fourth embodiment of this invention.

Please amend the paragraph beginning on page 18, line 17, as follows:

~~{Fig.-16}~~ It is a FIG. 16 (a)-(p) illustrate schematic cross section illustrating sections of exemplary aspects of the fifth embodiment of this invention.

Please amend the paragraph beginning on page 18, line 19, as follows:

~~{Fig.-17}~~ It is a FIG. 17 (a)-(n) illustrate schematic cross section illustrating sections of exemplary aspects of the sixth embodiment of this invention.

Please amend the paragraph beginning on page 18, line 21, as follows:

~~{Fig.-18}~~ FIG. 18 (a) is a schematic cross section illustrating the structure of a Cu dispersed evaluation of four testing samples sample (SIMS analysis performed from the direction shown by an arrow mark) and (b) is a diagram showing the thickness of the respective component layers thereof.

Please amend the paragraph beginning on page 18, line 25, as follows:

~~{Fig.-19}~~ It FIG. 19 is a diagram showing the conditions of Cu diffusion in samples of different structures determined by the SIMS.

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Please amend the paragraph beginning on page 18, line 27, as follows:

~~{Fig. 20}~~ FIG. 20 (a), (b), (c) and (d) are diagrams showing sectioned SEM photographs (upper: sample 1, lower: sample 3) of Si/organic polymer/Cu interfaces before and after annealing.

Please amend the paragraph beginning on page 18, line 30, as follows:

~~{Fig. 21}~~ ~~It is a diagram~~ FIG. 21 (a) through (d) are diagrams showing the conditions of Cu diffusion in an organic polymer the organic polymers illustrated in (c) and (d), respectively, as determined before and after annealing by the use of the SIMS.

Please amend the paragraph beginning on page 19, line 1, as follows:

~~{Fig. 22}~~ ~~It~~ FIG. 22 is a diagram showing the section SEM photographs of a Si/Cu/borazine polymer/organic polymer interfaces before and after annealing.

Please amend the paragraph beginning on page 19, line 3, as follows:

~~{Fig. 23}~~ ~~It~~ FIG. 23 (a) is a diagram showing the conditions of Cu diffusion ~~in a~~ in the borazine polymer/organic polymer illustrated in (b) as determined before and after annealing by the use of the SIMS.

Please amend the paragraph beginning on page 19, line 6, as follows:

~~{Fig. 24}~~ ~~It~~ FIG. 24 is a diagram depicting comparison of the condition of Cu diffusion in an organic polymer and a BSP (sample 3 and sample 4 having undergone no annealing treatment) as determined by the use of the SIMS.

The above amendments were necessary so that a brief description of each available figure was provided.

An updated/modified survey of the prior art did not yield a reference more germane than those already of record. Accordingly, claims 4-9 are allowable.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARC S. ZIMMER whose telephone number is (571)272-1096. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jim Seidleck can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

May 5, 2008

/Marc S. Zimmer/
Primary Examiner, Art Unit 1796